CONVENTIONAL CABLE LOGGING — AN ECONOMIC PROFILE

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BUILDING BLOCKS FOR ECONOMIC DEVELOPMENT & ANALYSIS

PREFACE

PURPOSE

Building Blocks have been conceived and developed by the Economic Development Branch of the Ministry of Sustainable Resource Management, under the guidance of Nancy South, Manager Economic Analysis, as an analytical tool that supports British Columbia coastal and land and resource use planning and decision-making and economic development initiatives. The Blocks contain concise business and sector information for a broad range of resource-based business types in BC. At this point, there are more than 30 Blocks either complete or in draft form. Several more Blocks have been identified as high priority by planning tables and other client groups. Additional Building Blocks will be developed over time, and some Blocks may be updated. For the most current Building Blocks, please see the Ministry of Sustainable Resource Management website, at: http://srmwww.gov.bc.ca/rmd/ecdev/

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BENEFITS

Building Blocks are expected to provide the following general benefits:

- Increase efficiency and more informed decision-making by providing readily accessible, credible information to planning and economic development processes;
- Improve the consistency of economic information across planning areas;
- Support economic analysis and decision-making that occurs outside formal coastal and land use planning processes; and
- Provide linkages between economic analysis and other social and environmental analytical tools (through identifying resource requirements to support economic activities and general compatibilities with other sectors and values).

LIMITATIONS

Every effort has been made to ensure that the information contained in Building Blocks is accurate and consistent. Approved, credible data sources are the foundation for Building Blocks. All Blocks were reviewed by sponsoring agencies and other experts. However, users are cautioned that information is used at their own risk, and that the authors and sponsors are not liable for any damages. Any conclusions or interpretations by the authors are not intended to represent government policy. Also, note that Building Blocks do not provide site specific information nor do they consider requirements for sustainability (social, community, environmental).

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RECOMMENDED REFERENCE/CITATION

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1.0 OVERVIEW OF BUSINESS OPPORTUNITY

1.1 Description

- This building block describes a conventional large scale (100,000 m^3 or greater log harvest per year) ground-based logging operation (as compared to helicopter logging).
- Ground-based logging involves the use of steel towers with cable systems as the key piece of equipment required to move (yard) logs from the forest stand where they are felled and bucked to a haul road where the journey begins for delivery of logs to a processing facility.
- This logging activity is the start of a continuum of forest industry activity that proceeds through log sorting, manufacturing, and distribution of finished wood products to world markets.
- Logging provides the essential wood fibre which is the raw material for lumber, pulp and other forest products.

1.2 Areas Where Logging Can Be Developed

- This building block focuses on conventional cable logging operations in the Northern Coastal areas of BC: the Mid Coast, the North Coast and the Queen Charlotte Islands – Haida Gwaii.
- To achieve an annual harvest of 100,000 m3 or more over several years a forested area with good quality timber is essential for a viable logging operation.
- Given the mountainous topography, logging operations of this magnitude normally will occur in a river drainage system with one or more valleys extending into the mountains from a river mouth at the ocean or a major river.
- Based on the above, a combination of good water access, reasonable foreshore area and, of course, a sufficient volume of merchantable timber are prerequisites for a viable logging operation.
- Because of the high costs of mobilization and de mobilization of the logging operation, the much preferred foreshore locations would yield multiple years of harvest, essentially the more years the better to minimize development and accessing costs.

1.3 Key Products

- Softwood logs including hemlock, balsam, red cedar, yellow cedar, sitka spruce and Douglas-fir (in the south).
- The logs are often categorized as sawlogs or pulp logs to reflect quality and grade differences which have a major impact on log prices.

1.4 Marketing

- Depending on the ownership of the Crown forest tenure, logs are consumed at the manufacturing facilities of the tenure holder, sold into the Vancouver log market for domestic consumption or, in some cases, sold for export.

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1.5 Production

- There are four basic steps involved in a major harvesting operation: (1) approvals and planning, (2) access, cut block layout, road building and mobilization, (3) logging per se, and (4) demobilization and road deactivation.
- The focus of this building block is on large scale conventional cable logging under relatively isolated circumstances.

1.6 Selection of a Harvesting Area

- Key criteria for preferred logging areas are an abundance of high quality timber, easy terrain for logging and road building.
- Other factors would be short travel distances to the site and ready access to labour.

1.7 Associated Businesses Providing Direct Inputs Necessary for Logging

- Logging equipment suppliers as well as forestry and engineering services.
- Transportation providers for barging equipment and logs.
- Air and water carriers to transport personnel.

1.8 Overview of Existing Logging Industry

- The logging industry is among the largest business sectors in the northern Coastal area of BC and has been a mainstay of the regional economy.
- In addition to the logging activity itself, regional centers such as Campbell River, Port Hardy and Terrace fulfill roles as major supply centers for logging in the region.
- Vancouver is a source for certain requirements such as large logging machinery and also is a primary supply center for the Queen Charlotte Islands – Haida Gwaii.
- In 1999/2000 the annual harvest is estimated at about 4,000,000 m^3 for the northern Coastal area and had an estimated value of approximately $400,000,000.

2.0 RESOURCE REQUIREMENTS / SENSITIVITIES

2.1 Provincial Crown Land Resources Required to Support Business

- A major logging operation of over 100,000 m3 per year harvest takes place within a Crown forest on a major forest tenure such as a Forest Licence or Tree Farm Licence.
- At a stand density of 550 m^3 per hectare, the area clear cut will be about 190 hectares per year.
- Given the typical dispersal of merchantable stands within a forested area which includes rivers, streams, lakes, wetlands and rock outcrops, etc. the total area over which the harvest cut blocks will be dispersed is many times larger than the actual area logged.

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2.2 Resource Capability

- The Provincial Government planning processes are designed to identify potential harvestable areas as well as areas which must be set aside for protection from harvest.
- While the history of logging on the BC Coast reflects a process of accessing the best and easiest timber first, the other major issue affecting logging has been the constant input of technological innovation which has extended both the ability to access more remote timber and to use timber of lower quality.
- In the case of conventional cable logging, potential old growth sites are becoming increasingly scarce because of set asides for other uses. However, a new trend has begun to emerge already and is most evident on the south Coast – this trend is the logging of mature second growth stands which are reaching harvestable size on sites that were logged in the earlier part of the last century. This same trend will eventually occur on the northern Coast but will be several decades in the future.

2.3 Foreshore Access

- Good foreshore access is essential in this type of operation in typically remote settings without road access by land.
- The foreshore access provides a suitable staging area for men and equipment during both the development and operational stages of logging.
- The foreshore must be large enough to permit a loading and unloading area for all the equipment, especially the yarders, and also be suitable for a log dump to access the booming area.
- Normally the area immediately upland from the foreshore provides the location for a logging camp if it is to be land based.

2.4 Critical Thresholds

- An annual harvest of 100,000 m^3 should be considered as a minimum, a preferred harvest level would be 150,000 m^3 or more.
- Stand volume generally 550 m^3 per hectare; greater volume per hectare is preferred.
- Just as location is the most important factor in real estate, location is also the factor of greatest importance for logging since the location of the forest to be harvested defines all the critical factors affecting the viability of the operation, namely:
  - tree species, age, size and quality and timber stand density
  - accessibility, haul distance, and stand terrain difficulty.
- The range of variability of these critical factors affecting logging "chance" results in exceedingly great challenges for loggers and exceedingly wide variation in the structure of operations at different locations; i.e., what works in one location may be the exact opposite of what works somewhere else – but both are appropriate in their specific applications.
- The more distant the location from the closest supply and marshalling point the more costly will be all aspects of transportation and also the greater the risk of disruptions of operations, especially because of adverse weather.

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- While a single year's harvest is possible at one site, a multi year operation developed at the same foreshore location is sought because of the improvement to harvesting economics.

2.5 Potential Conflicting Relationships with Other Resource Values

- Significant potential for conflict with other resource values could occur but evolution of the Provincial land and resource planning procedures and Provincial and Federal regulations mitigate the potential conflicts to the extent that forest harvesting generally is not permitted in favour other resource values.
- There is potential for logging to disturb both fish and wildlife and to disrupt their habitat as well as to adversely affect sites for some plant species.
- Alternatively, logging also has the potential for positive impact on certain species which benefit from site disturbance.
- With regard to the range of other resource users, logging has potential for creating both positive and negative relationships.
- Logging can interfere with visual quality and solitude sought by wilderness tourists and could threaten spawning fish.
- Alternatively, logging can provide a source of access and support for other resource uses, including wilderness tourists, especially for supplies or if emergency assistance is required.

3.0 REGULATORY REGIME

3.1 Tenures and Approvals

- Logging of volumes greater than 100,000m3 per year for a number of years will require a Forest Licence or Tree Farm Licence tenure which is issued by the Ministry of Forests.
- These tenures establish specific procedures and documentation for harvesting approval and are designed to integrate with the higher level planning which is the responsibility of the Ministry of Sustainable Resource Management.
- The key document for a Forest Licence is the Forest Development Plan which deals with all major considerations such as viewscapes, terrain stability, water resources, fisheries, wildlife habitat areas, archaeological issues, etc.
- The FDP process requires that the FDP proponent provides opportunities for input from government agencies and all public groups, including First Nations.
- Recent court decisions have prompted a new Provincial policy which requires a more rigorous approach to consultation with First Nations.
- The comprehensiveness of this planning process is designed to resolve potential conflicts before they can occur.
- Other related approvals include considerable field reconnaissance by various resource professionals to develop information and prepare plans for action.

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- In addition to the FDP as required under the *Forest Act* there is also the need for Silviculture Prescriptions, Road Permits, Road Use Permits, Cutting Permits and Special Use Permits (e.g. for gravel pits).
- Road Permits which involve river crossings will require approval from the Ministry of Water Land and Air Protection under the *Environment and Land Use Act* as well as the Federal Department of Fisheries and Oceans under the *Fisheries Act*.
- The foreshore area and water dumpsite will require the following approvals:
  - Crown foreshore lease from Land and Water BC Inc.
  - *Navigable Waters Protection Act* from Canadian Coast Guard
  - *Fisheries Act* from Department of Fisheries and Oceans.

3.2 The Approval Process

- Under typical circumstances the process for approval of a FDP and the ancillary approvals will require at least a year but a two year period would not be unusual.
- This length of time is required to obtain all the information, prepare the documentation and follow the approval routines.
- Delays, especially caused by extreme weather conditions preventing site visits, are common but unavoidable.
- Fortunately it is possible to collect data and begin planning during the FDP approval process.
- Suffice it to say the approval process is thorough and time consuming but should ensure that logging occurs in a manner which prevents environmental damage and preserve other resource values.
- Depending on a number of site specific variables such as travel distance to the proposed harvest area, the difficulty of the terrain both for site visit access and for planning harvesting blocks and road access, the FDP approval process could cost from $7 to $20 per m^3.
- The strict demands of the regulatory regime as well as the high cost and lengthy time to achieve approvals sets a high standard for performance and essentially creates a barrier to entry for all but the knowledgeable, skilled, well financed and dedicated operators.
- While the process is demanding, the procedures and requirements are applied on a uniform basis for all operators.

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4.0 INVESTMENT REQUIREMENTS

- Development of a new logging site for an annual harvest of 100,000 m^3 per year is a multi-year process:
  - Year 1 - 2: planning and approvals process
  - Year 3: site development and road building
  - Year 4 +: logging plus advance road building for future year's logging

4.1 Start-Up Costs

- The start up costs for logging begin with the planning and approvals process and end with the commencement of harvesting the first blocks.
- The planning and approvals process will require considerable professional and technical expertise (perhaps 2 to 3 FTEs) and involve information processing and costly site visits – this cost can range from $9 to $20 per m^3.
- The development of foreshore access including the dump site, booming grounds could range from $0.7 - $2 per m^3 and initial road construction could be $12.50 or more per m^3, depending on road right of way conditions.
- Equipment mobilization at the new site could cost about $0.25 per m^3.
- If a logging camp is required, this cost would be approximately 1m^3$ but could be higher depending upon the approach used for costing the facility and the extent of the development.

4.2 Ongoing Costs

- Once the logging operation is established at the new site with a year's road construction in place, the logging operation begins its first year of full operation to achieve the annual production of 100,000 m^3.
- The factor inputs and costs for this hypothetical operation are as follows:

Falling	$ 4.50 / m^3
Spar Tower	15.24)
Grapple Yarde	9.45) ½ volume to each machine
Log Loader (2)	7.50
Hauling	4.50
Water Dump	4.50
Road Construction	12.50
Admin & Supplies	7.25
Road Main, etc.	1.20
Crew Access	1.50

- An operation of this nature would require a crew of 22 on a FTE basis (this includes the fallers).
- Higher stand density and larger, high quality timber will improve the economics of the operation, just as will increased volume above 100,000 m^3.

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4.3 Capital Requirements

- There is a wide range in options for logging equipment from leased to purchased and from new to used.
- Normally logging operators ensure that key pieces of equipment are in good condition to provide high productivity without breakdowns.
- Typical equipment required for this type of operation includes:
  - Spar Tower $ 80,000
  - Grapple Yarder 1,500,000
  - Loader 500,000
  - Truck 150,000
  - Misc 500,000
- The initial capital investment is in the range of $2,000,000 plus.
- Because of the heavy wear on the equipment, equipment upgrades are made on a regular basis.

5.0 KEY INFRASTRUCTURE REQUIREMENTS

- Since logging operations are designed to be self sufficient when operating under adverse conditions in isolated locations, infrastructure requirements are not as critical as they are for many industries.

5.1 Transportation

- Because of the isolation of typical northern Coast logging operation, transportation represents the key infrastructure issue.
- There are three different requirements for transportation: personnel travel, transport of equipment & supplies, and shipment of logs.
- Transportation of personnel: starts with information gathering visits for forestry and infrastructure planning by small crews which make short term visits by helicopter, float plane and /or crew boat.
- Once the construction phase begins for the log dump, camp site, road right of way logging and road construction, the smaller crews for these activities may commute daily by crew boat if there is nearby accommodation.
- When the full logging operation begins a year after road construction the crews will normally use a camp at the site or, if close enough, commute daily from a nearby camp location.
- The regular travel of crews to the logging site will be by crew boat or float plane, depending on the particular location of the logging.
- The major pieces of logging equipment, supplies and bridges for roads, essentially all the heavy equipment and materials, are transported to the logging site by barge during the mobilization at the commencement of operations and as required during the phasing of new road development.

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- Once logging is finished, the equipment is removed from the location by barge in a demobilization process.
- If logging is complete in the drainage, the bridges and other materials may be removed for possible reuse elsewhere.
- This example of logging assumes that limited log sorting will occur at the landing into sawlog, pulpwood and possibly export log bundles which are truck-load sized and are held together with bands of wire rope.
- Alternatively, if the foreshore site is large enough and if harvesting is to occur for a number of years, a log sort area could be developed. (this log sort could be in the water but is more likely to be a dry land sort) [see log sort building block].
- Once hauled by truck to the water dump site, the log truck bundles are dumped into the booming grounds and held until there is sufficient volume for shipment.
- Since most of the log harvest from this northern Coastal area is destined for Lower Mainland, log barges are used for shipment.
- Depending on location and opportunity, some log bundles may be towed to regional destinations for sorting or possible to Prince Rupert for loading on ships for export.

5.2 Energy

- Because of the remote location of the typical logging show, it is most unlikely that electricity from the Provincial power grid will be available for use at the logging site.
- Aside from a diesel generator used to supply electricity for a camp, the rest of the equipment relies on internal combustion engines for power, normally diesel engines with the possible exception of gas engines in pickup trucks.
- Essentially, given the isolated locations for typical operations, all logging is self sufficient for the generation of energy.

5.3 Communications

- The traditional necessity for logging to operate in isolated locations which lack normal communications channels means that logging operations have relied on radio telephone communications and more recently satellite phones; therefore, logging operations enjoy good communication service.

6.0 MARKET

6.1 Location

- Most logs harvested in the northern Coastal area are destined to be shipped by barge to the Lower Mainland.
- Depending on the particular log specifications and the possibility of an ownership link between the logging operation and the sawmill, logs may be sent directly to a company sawmill for log breakdown.

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- Alternatively, and especially if only limited sorting has been done at the logging site, a log barge will deliver the logs for grading and sorting to a log sort such as the sorting operations in Howe Sound.
- Once this process is complete and the logs are separated into sorts, the logs are sold by species group and grade.
- Depending on market opportunities, some logs could be sold for export and loaded on a freighter in northern ports such as Prince Rupert.

6.2 Access to the Market

- The Vancouver log market is the traditional market for sale of logs which are not required at an operator's own sawmill.
- Log brokers provide the marketing service if required.
- Log prices reflect the derived demand for lumber since lumber is the main product driver for the vast majority of logs.
- For example, log prices for red cedar reflect the high value of cedar as a preferred lumber species, especially if the log grades yield high volumes of clear lumber for high valued products such as interior paneling.
- The interactions of domestic, US and offshore market demand for various types of lumber as well as the interactions of demand for wood chips (obtained from pulp logs and / or as a by-product of lumber manufacture) for pulp create ever changing price relationships which characterize the typical log market situation.
- As a log seller, the logging operation has only limited ability to beneficially influence the flow of logs into the market at a particular time – once the decision to log is made, the operation must accept market prices months in the future when the first log shipments reach market.
- A further complication results from the availability of barge service – premiums can be charged for special barge service yet delays in shipment to market can expose the logger to the risks of declining demand and prices.
- Log prices are collected by species and grade and this information is maintained in the Vancouver Log Market Price Series which can provide insights on price trends to assist in planning logging operations.

6.3 Market Demand

- Log demand is driven principally by world demand for lumber because lumber products provide the highest product volume yield and also the highest product value from logs from a typical stand of timber.
- The combination of high lumber yield and high lumber value support the high logging costs which otherwise would be too expensive to justify the harvest of low grade logs primarily yielding wood chips for pulp.
- Wood chips for pulp are produced as a by-product, both from low quality logs unsuitable for lumber and also as a by-product of lumber manufacture from sawlogs.

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- During periods of strong lumber demand, lumber recovery from marginal logs can reduce the supply of by-product wood chips; however, the lumber demand will trigger increased logging and increased the supply of pulp logs.
- During periods of weak lumber demand, logging can decline and lead to a scarcity of wood chips.
- Lumber species and grade preferences also have a direct impact on logging and log prices – during recent market conditions the strong demand for cedar lumber products has focused logging on stands with high cedar content while stands with high hemlock and balsam content have been uneconomic to log.

7.0 LABOUR MARKET

7.1 Skill Requirements

- Logging requires skilled labour with expertise as heavy equipment operators and good mechanical skills.
- The key to safe and productive operations are experienced equipment operators who can achieve high productivity under adverse operating conditions.
- Fallers have special expertise in falling and bucking large trees in a very high risk work situations.
- Chokermen must be physically fit and alert at all times to avoid injury, since logging is a tough job with high risks for the unwary.

7.2 Annual Wage Rates

- A typical wage rate for loggers is $34.00 per hour plus benefits of an additional 40% for a total of $47.00 per hour.
- This will generate an annual wage and benefit payment of about $67,000.00 – the point to note is that this is a high wage level relative to other wage rates which can be earned in non-extractive resource based activities within this region.

7.3 Employment Generated

- As a going concern once full production is achieved after the planning, approval and development phases, the logging operation will employ about 22 on a full time equivalent basis for the year of approximately 170 operating days.
- The operating season is normally from March 15th to November 15th with work schedules such as 10 days "in" camp working then 4 days "out" at home to accommodate the need to work in a camp situation.
- Historically the high wage rates have been a major incentive and ensured a good supply of skilled workers.
- However, the recent slow down and uncertainties in Coastal logging has meant that workers have been attracted to better opportunities such as in Alberta and currently this is creating local shortages of trained operators.

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8.0 CAPACITY

8.1 Resource Availability

- The allowable annual cut determinations establish the volumes of timber available for harvest.
- In the case of the existing forest tenures, these harvest levels are set for the term of the tenure; therefore, volumes available for logging are known in advance and support the type of logging development described in this building block.

8.2 Potential / Capacity for Growth

- Biologically the reforestation efforts today on the logged sites will yield good quality stands of timber in the future so ultimately there is excellent potential for growth in logging operations but only once the next rotation matures in 80 years plus.
- In the meantime, the capacity for growth is constrained since virtually no opportunities exist for new major tenure allocations and logging in this northern Coastal area has faced significant reductions in available harvest areas because of forest land allocations to other uses.

9.0 GOVERNMENT REVENUES

9.1 Stumpage Revenue

- The key source of Provincial government revenue is stumpage which is determined as a result of calculations based on the MoF Coast Appraisal Manual.
- Although the prices in stumpage calculations are based on averages of recent price trends in an attempt to match market prices, stumpage rates lag the actual market by at least three months.
- Therefore, in the critical period of making necessary adjustments to logging operations in a falling market, stumpage rates can continue to rise for a period of time.
- During the worst conditions of low prices and poor quality timber, stumpage can reach a minimum rate of \$0.25 per m^3.
- Under normal operating conditions with a greater percentage of high quality timber and high valued species such as red cedar stumpage can increase to the \$25.00 + per m^3 range.
- At minimum stumpage under adverse circumstances the annual harvest would generate \$25,000 in stumpage.
- At \$25 per m^3 the stumpage revenue would be \$2,500,000.

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9.2 Other Government Revenue

- Compared to stumpage revenue, other payments such as for rent on Crown foreshore land tenure are minor amounts.
- Other sources of government revenue are typical for any business: tax on corporate profits, sales tax on business inputs and taxes on employee earnings.

10.0 INPUT – OUTPUT TABLE

- A estimate of the economic inputs into and the outputs from a northern Coastal logging operation producing a minimum of 100,000 m^3 of logs per year is shown below.
- This estimate is based upon a hypothetical logging operation and the effort to prepare this scenario requires compromises and judgment to attempt to achieve reasonableness.
- Therefore, the derived coefficients should be recognized as estimates which are intended to provide indications of their relative orders of magnitude.
- Although the common unit of measure in logging $ per m^3, the information has been converted to $ per hectare (base upon 550 m^3 of logs per hectare or 182 hectares logged per year) to relate to other building blocks.

Estimated Coefficients per Hectare of Crown Forest Logged

Indicator on an Annual Basis	Rate	Rate Per Hectare
Log Sales Revenue	\$100 / m^3	\$55,000.00
Initial Investment	\$2,000,000	\$10,989.00
Start Up FTE Jobs	3	0.02
Operating FTE Jobs	22	0.12
Operating Payroll	\$67,000.00 / FTE	\$8,099.00
Stumpage Revenue at minimum	\$0.25 / m^3	\$137.50
Stumpage Revenue under good conditions	\$25 / m^3	\$13,750.00

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